EXHIBIT 12

UNITED STAES DISTRICT COURT
NORTHERN DISTRICT OF OHIO
EASTERN DIVISION

In re: WHIRLPOOL CORP. FRONT-LOADING WASHER PRODUCTS LIABILITY LITIGATION	1:08-WP-65000 MDL No. 2001 Class action Judge: James S. Gwin

Rebuttal Report of Dr. Chin S. Yang, Ph.D.

1. My name is Chin S. Yang. I am a Microbiologist with a specialty in mycology. I am currently employed as a Scientific & Technical Advisor and Senior Consulting Scientist at Prestige EnviroMicrobiology, Inc. A copy of my Curriculum Vitae, which sets forth my education, training, experience and qualifications in more detail, is attached hereto as Appendix A. I have been qualified as a microbiology expert on numerous occasions.

2. My educational and professional background has provided me with expertise in the identification and growth of fungi indoors. Specifically, I hold a BS and MS degree in Biology from Tunghai Christian University, Taichung, Taiwan, and received a Ph.D. in Forest and Environmental Biology from the State University of New York, College of Environmental Science and Forestry (SUNY-CESF) in Syracuse, New York. After receiving my Ph.D., I spent one year conducting research at the Plant Pathology Department of Cornell University as the Anna Jenkins postdoctoral fellow. The research at Cornell led to publications of two major mycological monographs, which include two new genera and more than ten new species. I spent an additional two years as a postdoctoral research associate at SUNY-CESF conducting research in aluminum and metal toxicity to tree seedlings as the result of acid rain.

3. I have worked as a staff microbiologist/mycologist for the U.S. Public Health Service ("USPHS"), Department of Health and Human Services. At the USPHS, I established an environmental microbiology laboratory in its Philadelphia office in the early 1990's.

4. I was employed as a microbiologist at the Northeast Center for Environmental Medicine, Syracuse, New York.

5. I have served as a panelist on grant-proposal reviews for the U.S. Environmental Protection Agency for several years.

6. I was a member in the mold workshop discussion leading to the promulgation and publication of the first New York City Guidelines on *Stachybotrys chartarum* in 1993. I also served as a panelist to the New York City Health Department in its promulgation of the revised mold guidelines in 1999 and in 2008.

7. I co-authored a U.S. EPA-funded document titled "Guidance for Clinicians on the Recognition and Management of Health Effects Related to Mold Exposure and Moisture Indoors" with researchers at the Univ. of Connecticut Health Center, Division of Occupational and Environmental Medicine, Center for Indoor Environments and Health in Farmington, CT. That document was published by the Univ. of Connecticut Health Center in September 2004.

8. I was a reviewer and contributor to the U.S. EPA document, "Mold Remediation in Schools and Commercial Buildings."

9. I was a panel member of the Scientific Review Panel commissioned by the California Research Bureau on "Mold Contamination Affecting Indoor Environments: Health Effects, Prevention, and Remediation," A Scientific Review Panel In Response to

A.B. 284, Chapter 550 Statutes of 2001, State of California to promulgate guidelines on indoor mold in the State of California.

10. I was trained in the analysis of *Legionella* bacteria, the causative agent of Legionnaire's disease, in environmental samples in the Centers for Disease Control and Prevention (CDC).

11. I have extensively studied and researched mycology, indoor mold, wood inhabiting fungi, wood decay, *Legionella* bacteria and Legionnaire's disease, microbial byproducts and microbial volatile organic compounds (mVOC's) in collaboration with other biochemists, microbiologists and mycologists. I have published peer-reviewed papers on *Legionella* bacteria and endotoxins.

12. For over 15 years (between 1987 and 2006), I supervised an environmental microbiology laboratory called P&K Microbiology Services, Inc. At P&K, we routinely isolated, detailed and identified fungi and bacteria from various sources, including the indoor environment, the heating, ventilating and air-conditioning (HVAC) system, slime or biofilms from various sources, and other environmental sources. I have published, in peer-reviewed journals, on the subject of indoor mold, wood inhabiting fungi and wood decay, and *Legionella* bacteria.

13. At my current employment, our laboratory routinely analyzes samples for fungi, bacteria, and other environmental microbes.

14. I have co-edited and/or co-authored three books and written dozens of peer-reviewed scholarly articles as well as book chapters in Environmental Microbiology texts on the subject of fungi, indoor mold, mVOC's and mycotoxins. The most recently

published book, "*Sampling and Testing for Indoor Microorganisms*," was published in April 2007. All articles and book chapters are peer-reviewed.

15. I have been asked by counsel for plaintiffs in this matter to provide rebuttals to the reports authorized by Dr. Harriet Burge and Dr. Ned Ostojic.

16. Prestige EnviroMicrobiology, Inc. is being compensated for my work in this matter at a rate of $250 per hour for general consultation, including review of documents, data, deposition transcript, preparation of report and affidavit, and at a rate of $450 per hour for legal support, including expert testimony, deposition and court appearance.

17. I have reviewed the following three reports. They are:

1. An "Expert Report on Whirlpool Front-Loading Washer," dated November 16, 2009, by Dr. R. Gary Wilson, Ph.D., PE.

2. A "Rebuttal Expert Report of Dr. Harriet Burge," dated December 16, 2009.

3. An "Expert Rebuttal Report of Dr. Ned Ostojic," dated December 16, 2009.

A Quick Overview of Biofilm

18. Biofilm is recognized as a complex but common biological community found on living surfaces, such as surfaces of leaves or of marine algae, and non-living surfaces, such as interior of water pipes. The website at the Montana State University, Center for Biofilm Engineering (http://www.erc.montana.edu/CBEssentials-SW/bf-basics-99/default.htm), illustrates biofilm formation and expansion. Washing machines are also known to accumulate biofilm in areas with frequent wetting or moisture contacts.[1,2]

[1] Munk, S., et al. 2001. Microbial survival and odor in laundry. J. Surfactants & Detergents vol. 4(4): 385-394.

19. Biofilm formation requires certain conditions. They include: a surface area for bacteria and other microbes to adhere to and start initial colonization; sufficient moisture for the microbes to establish the initial biofilm and to grow; and nutrients for the growth of microbes.

20. Biofilm will grow and expand in thickness and in size as long as moisture and nutrient persist over time. The longer the conditions exist, the larger the biofilm that will develop.

21. Biodiversity in the biofilm can increase over time, depending on a number of factors. They include water quality, microbial components in the laundry, natural fallout of airborne microbial particles, and the use and operation of the washer.

22. Established biofilm can also serve as the source of microbes for new biofilms down stream. For example, biofilm growth in the basket or tub of the subject washers can contribute to the biofilm formation in the sump area, pump strainer and drain hose.

23. The longer the favorable conditions for biofilm development persist, the more likely biofilm will develop and expand.

24. The reason for the increase in the biofilm problem in washing machines can be traced to a change in washing temperature. Previously, laundry washing at a temperature greater than 60°C helped the reduction of microbial loading inside the washer by pasteurization. The trend of using lower washing temperature increases the

[2] Wong, N.S., et al. 2008. Method and apparatus for treating biofilm in an appliance. US Patent# US 2008/0092928 A1.

risk of microbes surviving laundering, unless an antimicrobial agent, such as bleach solutions, is added.[3] Design issues in the subject washers greatly compound the problem.

25. Human-associated microbes, such as *Micrococcus, Staphylococcus, Streptococcus, Brevibacterium, Corynebacterium, Propionibacterium*, and yeasts from the genera *Pityrosporum* and *Candida*, are common contaminants of laundry. *Brevibacterium linens* and *B. casei* have been associated with the production of some cheeses and their odors. A common water-borne, environmental bacterium, *Pseudomonas aeruginosa*, is found in biofilm and known to produce a sweet, grape-like odor. Other bacteria and fungi are also known to produce a wide variety of microbial volatile organic compounds (mVOC's), hence odors.[4]

26. Axillary odors are odors associated with sweat and microbial growth in the under arm. Research has found that axillary microflora contain a mixture of Micrococcaceae, aerobic diphtheroids, gram negative rods, and *Propionibacterium*. The mixture was found stable. Among Micrococcaceae, *Staphylococcus aureus, S. epidermidis, S. saprophyticus,* and *Micrococcus* species were identified. The diphtheroids contained primarily *Corynebacterium* species. Among the gram negative bacteria, *Escherichia, Klebsiella, Proteus, Enterobacter,* and *Acinetobacter* species were identified. [5] Axillary odors have been associated with gram positive bacteria.[6]

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[3] Munk, S., et al. 2001. Microbial survival and odor in laundry. J. Surfactants & Detergents vol. 4(4): 385-394.

[4] Yang, C. S. and E. Johanning. 2007. Airborne Fungi and Mycotoxins. p. 972-988. in *Manual of Environmental Microbiology.* 3rd Edition. ASM Press.

[5] Leyden, J.J. et al. 1981. The Microbiology of the human axilla and its relationship to axillary odor. J. Investigative Dermatology, 77: 413-416.

[6] Munk, S., et al. 2001. Microbial survival and odor in laundry. J. Surfactants & Detergents vol. 4(4): 385-394.

27. Biofilms are also known as sources of pathogenic bacteria, such as *Pseudomonas aeruginosa* and *Legionella* bacteria (the etiologic agents of Legionnaires' disease).[7, 8]

28. As an example, *Pseudomonas aeruginosa* is known to survive well inside the washing machine. One major reason for the survival of *Pseudomonas aeruginosa* seems to be the capability of the bacteria to grow within biofilms that protects them from adverse environmental factors.[9]

29. Another example is *Legionella* bacteria, which are known to grow under certain conditions in biofilms, in which they are protected against disinfectants and adverse environmental conditions.[10] Individuals may be exposed to *Legionella* bacteria by inhalation of water droplets or mists when *Legionella*-containing biofilm develops.

Review of Dr. R. Gary Wilson's Report

30. In review of Dr. Wilson's report, I have no problem understanding what he tried to articulate concerning the design issues of the subject Whirlpool washers leading to microbial growth and biofilm buildup. Although he is not a microbiologist by training and his discussions of biofilm may not have used the terms of art used in microbiology, his engineering expertise, investigation, documentation and analysis, as detailed in his report, clearly show the defects in design of the subject washers from a microbiological point of view. Both Drs. Ostojic and Burge failed to recognize the fundamental but most important problems in the design of the subject washers.

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[7] Cornelis, P. 2008. Pseudomonas: Genomics and Molecular Biology. 1st Edition. Caister Academic Press.
[8] Fields, B.S. 2007. Legionellae and Legionnaires' Disease. p. 1005-1015. in *Manual of Environmental Microbiology.* 3rd edition. ASM Press.
[9] Hall-Stoodley, L,, et al. (2004). Bacterial biofilms: from the natural world to infectious disease. Nat. Rev. Microbiol. 2 (2): 95–108.
[10] Murga, R., et al. 2001. Role of biofilms in the survival of Legionella pneumophila in a model potable-water system. Microbiology 147: 3121-3126.

31. Both Drs. Ostojic and Burge ignored or failed to address the design issues that Dr. Wilson articulated on page 9 of his report.

32. Dr. Burge faulted Dr. Wilson's inspection of 12 washers that were not randomly selected and that Dr. Wilson's conclusion was based on the small number of machines. The design issues of the washers as detailed and discussed in Dr. Wilson's report are such that there is no doubt in my mind that biofilms will probably be found in a significant portion of the subject washers, based on my understanding of Dr. Wilson's report as well as my educational and research background and practical experience in dealing with microbes in various conditions and environments.

33. I strongly agree with Dr. Wilson's assessment that design issues in the tub, basket bracket, sump area, pump strainer and drain hose, door gasket, and other areas make the subject washers susceptible to microbial colonization and growth, and the formation and accumulation of biofilms in the subject washers.

34. The deep cavities and ribs in the subject washers increase the surface areas for bacterial and biofilm adhesion and buildup, allow for accumulation of residues, dirt and moisture, and promote biofilm expansion. This is a recipe for microbial colonization and biofilm formation, especially the machines did not clean themselves of this build-up to prevent re-contamination.

35. The door gasket is another area susceptible to microbial growth and biofilm formation due to the surface area, in frequent contact with or trapping of moisture, and severe build-up of dirt and debris.

Rebuttal to Dr. Burge's opinions

36. Dr. Burge, in entries 25 and 27 of her report, opined that "bacterial growth could occur within 24 hours after a cycle in a machine had ended, provided the water remains at 37°C (98.6°F) or higher during that period. If the water is colder, bacterial growth would take longer. The rate of bacterial growth also depends on the nutrient content of the water." This statement is erroneous because some bacteria of environmental origins may be inhibited at 37°C incubation.[11] A wide variety of bacteria are known to grow optimally at varying temperatures, including room temperature.[12] One can expect that a mixture of human associated and environmental bacteria is found on laundry of human origin.

37. Biofilms and their matrix of extra cellular polymeric substance (EPS) are relatively insensitive to temperature fluctuations and inert to heat transfer. Biofilms in cooling water systems are known to reduce heat transfer.[13] The usefulness of Dr. Burge's very precise temperature measurement of 37°C (98.6°F) in bacterial growth in biofilms is meaningless.

38. Dr. Burge speculated several "alternative explanations for the odors that have been perceived in connection with certain consumers' washing machines." First, she blamed anaerobic bacterial growth in the standing drain pipes and in machine plastic drain hoses. She claimed that this was "due to the "closed" nature of drain pipes and the presence of water and nutrients in those drain pipes." She then blamed the strong sulfur odor that emanated from Ms. Glazer's washer on "the flushing of water through the

[11] Tanner, R. 2007. Cultivation of bacteria and fungi. p.69-78. in Manual of Environmental Microbiology, 3rd edition, ASM Press.
[12] Patton, C. M. 2004. Microbes in the indoor environment. PathCon Publications.
[13] Characklis, W.G. 1981. Influence of fouling biofilms on heat transfer. Heat Trans. Eng. 3:23–37.

plastic drain hose and into the open wash basin." The common link of the odors, whether they were due to "closed" or "open" systems, is the washer.

39. The typical standing drain pipes are connected to either a septic system or a sewage system and are not "closed". If these were closed, as Dr. Burge speculated, the systems could have exploded from buildup of gases and pressure. There have been no reports of explosions from such cases. In fact, there are typically gas exhaust pipes built into the systems to discharge any odors and gases to the outdoors.

40. If the standing drain pipes and associated septic or sewage systems were the problem, the odor should have permeated the entire house, because there are typically several wastewater sources in a house drained into either the same septic or the sewer. Dr. Burge failed to identify the odors as having permeated customers' homes.

41. In entry 32 of her report, Dr. Burge opined that odors resulted from plastic drain hoses "containing bacteria that are growing in the absence of oxygen and are producing noxious odors". There are U.S. patents describing materials doped or coated with antimicrobials for use in washing machines.[14, 15] Dr. Burge failed to explain why Whirlpool failed to use such technology, or, if it did, why such technology failed.

42. Dr. Burge speculated without proof that such absence-of-oxygen conditions existed in the drain hoses. The hoses are connected to the washer and to the open drain pipes. The possibility of the absence-of-oxygen condition is extremely small.

43. Dr. Burge failed to address many photographs detailing discoloration and biofilm buildup in the inspected washers, as detailed in Dr. Wilson's report.

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[14] Schultheis, B. and K. Schaupert. 2006. Structural elements for washing machines, dryers or the like, doped or coated with germicidal material. US Patent# US 2006/0005584 A1.
[15] Haas, G. R., et al. 2008. Antimicrobial rubber formulations and molded article. US Patent# US 2008/0187560 A1

44. Whirlpool's own patent pointed out that microbial problems and biofilm issues were in the washers.[16] The industry and Whirlpool's competitors also agreed that the microbial and biofilm problems are associated with the washers, rather than drain pipes or drain hoses.[17, 18]

Rebuttal to Dr. Ostojic's Opinions

45. Dr. Ostojic, in entries 9-12 of his report, provided "an overview of relevant principles of olfactory science." He stated in entry 10 the following:

> even when the concentration of these volatile compounds rises to a level at which the odor is perceptible by the most sensitive people, at that level the odor would still remain undetectable to a large portion of the human population. In many cases, depending on the odorants involved, the concentration of volatile compounds needs to increase by one or more orders of magnitude above the threshold for the most sensitive individuals, before the odors become readily detectable by the majority of the human population.

This suggests to me that the mold, mildew and odor problems had been under-reported in the Whirlpool database and in Dr. Taylor's study because most owners are not trained to detect mold and mildew problems or to discern such odors. The mold, mildew and odor problems were likely there but not fully reported.

46. Dr. Ostojic, in entries 28-41 in his report, discussed a variety of factors affecting human perception of odor. He described extensively using ASTM E679-04 for

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[16] Wong, N.S., et al. 2008. Method and apparatus for treating biofilm in an appliance. US Patent# US 2008/0092928 A1.
[17] Kang, J-H., et al. 2009. Drum type washing machine and method for removing odor thereof. US Patent# US2009/0090394 A1.
[18] Munk, S., et al. 2001. Microbial survival and odor in laundry. J. Surfactants & Detergents vol. 4(4): 385-394.

testing olfactometry for measuring odor concentration. The test requires the employment of "a panel of screened and trained odor observers." This suggests that the test is semi-quantitative at best. The test clearly does not reflect a real world experience to a general human population.

47. Dr. Ostojic in entries 28 and 29 referenced an article, authored by Dr. Thad Godish, in the December 8, 2009 edition of *Allergy Consumer Review* on mold related odors. I accessed the same webpage and found it was a question-and-answer section on a commercial website. There is no indication that it was scientifically peer-reviewed. Dr. Godish was a professor of natural resources and environmental management at Ball State University. He was not a microbiologist or a mycologist. Given the nature of the article and Dr. Godish's background, the reliability of the article is open to question. This also raises the question whether Dr. Ostojic is considered an expert in mold related odors.

48. Dr. Ostojic spent significant amount of page space discussing various volatile organic compounds (VOC's) produced by fungi or mold but failed to realize that biofilms are composite of bacteria, fungi (mold and yeasts), algae, protozoa, etc., and their byproducts. Bacteria (including actinomycetes), fungi (including mold), and algae (including blue-green algae or cyano-bacteria) are known to produce so-called microbial volatile organic compounds (mVOC's). The mVOC's may include a wide variety of VOC's at varying concentrations. His discussions on human perception using human panelists are of limited usefulness when real humans in the thousands have reported such odors.

Conclusions

49. Biofilm buildup requires a surface for initial microorganisms to adhere, as well as moisture and nutrients for microbes to grow and multiply. All these factors are present in the subject washers. The design issues in the subject washers provide an ideal environment for biofilm growth by greatly increasing the surface areas for microbes to adhere and the spaces for trapping moisture and nutrients.

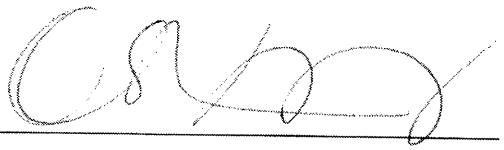
50. Microbes in biofilm can produce a wide variety of VOC's, some of which are odorous. Biofilm formation can lead to undesirable and unpleasant odors. These odors include musty, mildewy and moldy odors.

51. The foregoing opinions expressed in this report are held to a reasonable degree of scientific certainty in the field of microbiology.

52. The foregoing opinions are based upon my independent review and analysis of the reports and are formed by my background and qualifications in the area. I understand that additional documents may be available for my review. I reserve the right to produce supplemental reports with updates and necessary modifications.

Date: January 4, 2010

Respectfully submitted,



Chin S. Yang

APPENDIX A

CHIN SHAN YANG, PH. D.

EXPERIENCE:

Scientific and Technical Advisor/Senior Consulting Scientist, July 1, 2008-present, Prestige EnviroMicrobiology, Inc., Voorhees, New Jersey: provide consulting and laboratory services to industrial hygienists and environmental health professionals on characterization of aero-allergens and air-borne microflora; microbiological investigation and control in indoor environment

Independent Consulting Scientist, 7/2006-6/2008: provide consultative services on environmental mycology and microbiology.

President, 4/2003-7/2006, P & K Microbiology Service, Inc. (a wholly-own subsidiary of Severn Trent Laboratories, Inc.), Cherry Hill, New Jersey: provide consulting and laboratory services to industrial hygienists and environmental health professionals on characterization of aero-allergens and air-borne microflora; microbiological investigation and control in indoor environment. (retired July, 2006)

Chief Technical Officer, 5/2004-7/2006, Aerotech-P & K. (an affiliate of Severn Trent Laboratories, Inc.).

President, 4/94-4/2003, P & K Microbiology Service, Inc., Cherry Hill, New Jersey: provide consulting and laboratory services to industrial hygienists and environmental health professionals on characterization of aero-allergens and air-borne microflora; microbiological investigation and control in indoor environment.

Scientific Director, 1/1996-1/1998, Building Air Quality Alliance (BAQA), the University City Science Center, Philadelphia, Pennsylvania: provide scientific and technical directions to the BAQA, a privatized program originally designed and set up by the Indoor Environment Division, U.S. Environmental Protection Agency.

Board Director, 1/92-9/2004, Mid-Atlantic Environmental Hygiene Resource Center, Philadelphia: helped found the Center with supports from the EPA Region III and the U.S. Public Health Service Region III and has served on the Board of Directors since 1992.

Contract consultant, 5/1994-4/1995, U.S. Public Health Service, Division of Federal Occupational Health, Region III, Philadelphia, Pennsylvania: provide consultation and training in environmental microbiology and aerobiology to the agency.

Staff microbiologist, 3/93-4/94, Office of Environmental Hygiene, U.S. Public Health Service, Division of Federal Occupational Health, Region III, Philadelphia, Pennsylvania: directed Indoor Air Quality Assessments, laboratory safety and health program, environmental microbiology and asbestos laboratories, and coordinated all training activities in indoor air quality and laboratory safety.

Contract consultant, 1/90-3/93, U.S. Public Health Service, Division of Federal Occupational Health, Region III, Philadelphia, Pennsylvania: organized and set up an Environmental Microbiology Laboratory; conducted investigation and studied in environmental microbiology (microorganisms in air and water); principal investigator of an EPA sponsored project titled "Dust mites and cat dander as indoor air pollutants".

Director, 6/87-3/93, P & K Microbiology Service, Cherry Hill, New Jersey; provided consulting and laboratory services to industrial hygienists and environmental health professionals on characterization of aero-allergens and air-borne microflora; microbiological investigation and control in indoor environment.

Microbiologist and consultant, 8/82-3/01, Northeast Center for Environmental Medicine (Dr. Sherry A. Rogers. M.D., F.A.C.A.), Syracuse, New York: study and identify allergenic microorganisms.

Laboratory Director, 10/89-2/91, Chenango Environmental Laboratory, Binghamton, New York: directed and operated an asbestos laboratory and, expanded the laboratory into a full service environmental laboratory.

Senior microscopist, 6/88-9/89, Independent Asbestos Labs, Inc., East Syracuse, New York: chief microscopist in an asbestos laboratory with PCM, PLM, and TEM capability.

Visiting scientist, 11/88-8/90, the State University of New York, College of Environmental Science and Forestry (SUNY-CESF), Syracuse, New York: conducted research on mycorrhizae of sugar maple.

Research scientist and co-principal investigator, 11/87-11/88, SUNY-CESF, Syracuse, New York: conducted research on a project entitled: Production of Edible Mushrooms via Bioconversion of Agricultural and Forest Waste, funded by New York State Science and Technology Foundation.

Postdoctoral research associate, 8/85-7/87, the SUNY-CESF, Syracuse, New York: conducted research on scandium and aluminum toxicity to seedlings of honey locust and loblolly pine.

Anna E. Jenkins Postdoctoral Fellow in Mycology, 7/84-7/85, Department of Plant Pathology, Cornell University, Ithaca, New York: worked with Dr. Richard P. Korf on a world monograph of *Tricharina*. Two new genera and fourteen new species, in addition to some already described taxa were treated in two publications.

Doctorate graduate student and research assistant, 9/78-6/84, SUNY-CESF, Syracuse, New York: conducted research on projects funded by USDA.

EDUCATION:

Medical Microbiology, State University of New York, Health Science Center at Syracuse, New York, successfully completed a course in Medical Microbiology (virology, bacteriology, & mycology), 9/1988 - 2/1989.

Ph.D., in Forest and Environmental Biology, State University of NY, College of Environmental Science and Forestry at Syracuse, New York, 9/1978 - 7/1984.

Graduate study, Life Sciences, University of Nebraska at Lincoln, Nebraska, 9/1977 - 5/1978.

Master in Science (MS), Biology/Botany, Tunghai University, Taiwan, 9/1975 - 6/1977.

Bachelor in Science (BS), Biology/Botany, Tunghai University, Taiwan, 9/1971 - 6/1975.

PROFESSIONAL TRAINING:

AHERA Inspector and Management Planner
NIOSH 582 (Equivalent) Sampling and Analysis of Airborne Asbestos Dust
Asbestos Identification by Polarized Light Microscopy
Buildings: Understanding Systems and Reading Blueprints
Household Hyphomycetes and Other Indoor Fungi (Texas Department of Health)
Isolation and Identification of Legionellae (Centers for Diseases Control and Prevention)
Applications of Polymerase Chain Reactions (American Type Culture Collection)
Food Mycology (Am. Soc. Microbiology)
Method for Detecting, Identifying, and Enumerating *Giardia* and *Cryptosporidium* in Water Samples (EPA and AWWA)
IAQ Diagnostics: Building Ventilation and Pollutant Transport (EPA Train-the Trainer course)
Identification of Significant Species of *Aspergillus* and *Penicillium* (Texas Department of Health)

PROFESSIONAL MEMBERSHIPS (up to 2006):

American Society for Microbiology
American Phytopathological Society
American Public Health Association

American Industrial Hygiene Association
American Conference of Governmental Industrial Hygienists
American Society for Testing and Materials
American Society of Heating, Refrigerating, and Air-Conditioning Engineers
American Biological Safety Association
British Mycological Society
Mycological Society of America
Sigma XI, The Scientific Research Society

OTHER PROFESSIONAL ACTIVITIES:

2007 Member of review panel on the revision of 2000 NYC Mold Guidelines (issued in November 2008)
Member of Scientific Review Panel on "Mold Contamination Affecting Indoor Environments: Health Effects, Prevention, and Remediation," A Scientific Review Panel In Response to A.B. 284, Chapter 550 Statutes of 2001, State of California. (2002-2006). Leading to publication "**Indoor Mold: A General Guide to Health Effects, Prevention, and Remediation. Report in Response to A.B. 284, Chapter 550, Statutes of 2001.**" by *Kenneth W. Umbach, Ph.D., and Pamela J. Davis, R.N., P.H.N. (CRB-06-001, January, 2006).*
Member of the Board of Directors, American Red Cross, Camden County Chapter (2004-2005)
1999 Member of review panel on NYC Mold Guidelines, leading to 2000 NYC Guidelines on Mold
1993 Invited participant in the Mold workshop organized by NYCDOH, leading to 1994 NYC Guidelines
1998 EPA ORD Proposal review panel
1997 EPA ORD Proposal review panel
1996 EPA ORD Proposal review panel
1995 EPA ORD Proposal review panel
1993 EPA Proposal review panel
AIHA Member of the Environmental Microbiology Laboratory Accreditation Committee (1995-2000)
AIHA Member of the Indoor Environment Quality Committee (1998-2000)
Organizing Committee of the Third International Conference on Bioaerosols, Fungi, and Mycotoxins, September 23-25, 1998. Saratoga Springs, New York.
Organizing Committee of the International Conference on Fungi, Bacteria in Indoor Air Environments. October 6-7, 1994. Saratoga Springs, New York.

SCIENTIFIC PUBLICATIONS:

Li, D.-W. and C. S. Yang. 2005. Taxonomic history and current status of *Stachybotrys chartarum* and related species. *Indoor Air* 15 (suppl. 9), 5-10.

Lin, K-T., De-wei Li, D. A. Denis, R. Woodcock, and Chin S. Yang. 2005. Qualitative identification of *Meruliporia incrassata* using real time Polymerase chain reaction (PCR). p. 335-342, in "Bioaerosols, Fungi, Bacteria, Mycotoxins and Human Health: Patho-physiology, Clinical Effects, Exposure Assessment, Prevention and Control in Indoor Environments and Work." Edited by E. Johanning, MD. Fungal Research Group Foundation, Inc., Albany, NY.

Negar Mahooti-Brooks, Eileen Storey, Chin Yang, Nancy Simcox, William Turner, Michael Hodgson. 2004. Characterization of Mold and Moisture Indicators in the Home. J. Occu. and Env. Hygiene 1(12): 826 - 839

Moon, Ralph E., De-wei Li, and Chin S. Yang. 2004. Mold-contaminated fabrics: cleaning effectiveness comparison – Part 2. Cleaning & Restoration 41 (11): 30-36.

Moon, Ralph E., De-wei Li, and Chin S. Yang. 2004. Mold-contaminated fabrics: cleaning effectiveness comparison – Part 1. Cleaning & Restoration 41 (10): 30-38.

Li, De-wei and C. S. Yang. 2004. Notes on indoor fungi I: New records and noteworthy fungi from indoor environments. Mycotaxon 89: 473-488.

Morrison, J., C. Yang, K-T. Lin, R. A. Haugland, A. N. Neely, and S. J. Vesper. 2004. Monitoring *Aspergillus* species by quantitative PCR during construction of a multi-story hospital building. J. Hospital Infection 57 (1): 85-87.

Yang, C. S. and P. J. Ellringer. 2004. Antifungal treatments and their effects on fibrous glass liner. ASHRAE Journal 46(4): 35-40.

Bracker, A., E. Storey, C. Yang, and M. Hodgson. 2003. An outbreak of hypersensitivity pneumonitis at a metal-working plant: a longitudinal assessment of intervention effectiveness. Appl. Occu. Env. Hyg. 18: 96-108.

Li, D.-W., C. S. Yang, R. Haugland and S. Vesper. 2003. A new species of *Memnoniella*. Mycotaxon 85: 253-257.

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